COURSE DATA

DATA SUBJECT

Code: 34089
Name: Microbiological and Parasitological Analyses
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1201 - Degree in Pharmacy	Facultat de Farmàcia i Ciències de L'alimentació	4	First quarter
1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics	Facultat de Farmàcia i Ciències de L'alimentació	4	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1201 - Degree in Pharmacy	Clinical analysis and laboratory diagnostics	COMPULSORY
1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics	Asignaturas obligatorias del PDG Farmacia-Nutrición Humana y Dietética	COMPULSORY

COORDINATION

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SUMMARY

The material covers the vast field of clinical analysis applied to the diagnosis and monitoring of human diseases, from the microbiological point of view and parasitological.
Each of the matter presents particular thematic program, which continues as the main criterion carefully selected to allow the student to have a sufficiently broad broad field of microbiological diagnostic laboratory tests and parasitological but stressing and focusing on those aspects which by their frequency or relevance will require a better understanding of the student for further professional development. All this, trying that, as particular cases, students can draw conclusions, general operational procedures and ways they can apply later.

A) Microbiological Analysis:

- Introduction to clinical microbiological analysis. Sampling and processing.
- Classical microbiological diagnostic methods.
- Rapid diagnostic techniques: serological and molecular methods.
- Analysis of systemic infections, infectious hepatitis, central nervous system infections, respiratory tract and adjoining regions of the gastrointestinal tract, urinary tract and skin.
- Analysis of sexually transmitted diseases and infections, congenital and perinatal transmission.

B) Parasitological Analysis:

This part of the subject comprises 9 theoretical topics centred on the importance of parasitological analyses and related problems, as well as all aspects concerning the various analytical steps, from taking samples and transport to processing biological samples through suitable techniques for their diagnoses. The final analytical part refers to parasiyological diagnosis based on the knowledge of various parasitic structures. The theoretical part is completed by the practical part, in which students carried out all necessary methods and techniques for the diagnoses of all parasitic structures apt to be microscopically detected.

All in all, the subject focused on diagnostics correlates well with some of the Sustainable Development Goals (SDGs) part of the Agenda 2030. Concretely, the first six SDGs form part of the repercussions parasitic diseases have within the context of the world population. Countries, but particularly tropical and subtropical countries, present a series of parasitic diseases that affect the SDGs. Hence, this subject focused on diagnostics is fundamental in order to face parasitic diseases and, consequently, achieve a more sustainable world, with a better future for all.

In brief, this part of the subject concerns the following points:

- Importance of parasitological analyses for human health;

- Coproparasitological, haemaparasitological, genital-urinary, tissue, aspirate and other body fluid analyses and the corresponding diagnoses;

- Technical studies of arthropods and their diagnoses;

- Specific diagnostic techniques, immune-diagnosis and molecular diagnosis.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

It is recommended to have studied the subjects of "Microbiology" and "Parasitology" to access the subject "Parasitological and Microbiological Analysis." The student should also have completed the subject "Immunology" to facilitate the study of the subject.

COMPETENCES / LEARNING OUTCOMES

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Acquire and develop the skills necessary for the proper handling of all inventory and consumable materials used in diagnostics.

Act with autonomy in learning, making informed decisions in different contexts, issuing judgements based on experimentation and analysis, and transferring knowledge to new situations.

Address analytical problem-solving in an interdisciplinary manner with other professionals.

Apply such knowledge to the professional world, contributing to the development of human rights, democratic principles, principles of equality between women and men, solidarity, environmental protection and promotion of a culture of peace with a gender pe

Begin practical performance of microbiological analyses of samples, as well as interpretation of results for laboratory diagnosis.

Collaborate effectively in work teams, assuming responsibilities and leadership roles and contributing to collective improvement and development.

Contribute to the design, development and implementation of solutions that respond to social demands, taking into account the Sustainable Development Goals as a reference.

Demonstrate critical and self-critical thinking in the field of the degree programme, considering aspects such as professional ethics, moral values and the social implications of the different activities carried out.

Design, apply and evaluate reagents, clinical analytical techniques and methods, knowing the basic principles of clinical analyses and the characteristics and content of laboratory diagnostic reports.

Develop future professional awareness of the relevance of the diagnosis to be made.

Develop reasoned argumentation and rational criticism.

Develop skills to update knowledge and undertake further studies, including pharmaceutical specialisation, scientific research, technological development and teaching.

Establish the criteria necessary to arrive at a differential aetiological diagnosis of an infection, and in particular those to be followed for the collection, transport and processing of a specimen in a clinical laboratory.

Know and correctly apply the terminology and specific elements of the microbiology laboratory.

Know and critically manage documentary sources of all kinds within the field of parasitic disease

diagnosis.

Know and critically manage documentary sources of clinical biochemistry and haematology within the field of human disease diagnosis.

Know and develop the techniques in clinical biochemistry and haematology for the proper processing of any biological sample suitable for analysis in a clinical biochemistry and haematology laboratory.

Know and understand, within the field of the degree programme, gender inequalities in society; integrate different needs and preferences based on sex and gender into the design of solutions and problem solving.

Know and understand the bases of the methods and techniques used in clinical biochemistry and haematology for disease diagnosis and the principles of their application.

Know how to communicate effectively, both orally and in writing, adapting to the characteristics of the situation and the audience.

Know how to interpret, evaluate and communicate relevant data in the different areas of pharmaceutical activity, using information and communication technologies.

Know the most common infectious processes affecting different organs and systems, and the differential diagnosis of their causes or aetiological agents.

Know the most frequent aetiological agents, their pathogenesis and laboratory diagnosis.

Master parasitological analytical terminology.

Master the techniques necessary for proper parasitological processing of any biological sample suitable for analysis in a parasitology laboratory.

Module: Medicine and Pharmacology. Know and understand the basic principles of clinical analysis and the characteristics and contents of laboratory diagnostic reports.

Perform hygiene and sanitary analyses.

Possess and understand knowledge in the different areas of study included in pharmacist training.

Propose creative and innovative solutions to complex situations or problems within the field of knowledge, to respond to diverse professional and social needs.

Select the most sensitive, reliable and rapid laboratory tests for the diagnosis of a specific infectious disease or for the differential aetiological diagnosis of a specific syndrome.

Transmit ideas, analyse problems and solve them with critical spirit, acquiring teamwork skills and assuming leadership when appropriate.

Understand that any microorganism is usually capable of producing different clinical pictures and that a particular clinical process may be caused by different aetiological agents.

Understand the basics of the methods and techniques used in the diagnosis of parasitic diseases and the principles of their application.

Understand the diagnostic usefulness of each method and technique and know the biological material required for the correct diagnosis of different human parasitic diseases.

Understand the diagnostic usefulness of each method and technique in clinical biochemistry and haematology, assessing their specific use, prognostic value and required complementary tests, considering gender biases in clinical diagnoses.

DESCRIPTION OF CONTENTS

1. Microbiological laboratory tests. Sampling and processing.

Laboratory diagnosis of infectious diseases. Collecting and transporting samples for microbiological analysis. Regulations governing clinical laboratories.

2. Classical microbiological diagnostic methods.

Methods for culture and isolation of microorganisms. Culture media: types. ID: Microscopic examination of bacteria. Staining. Biochemical tests. Determination of the susceptibility of bacteria to antimicrobial agents. Antibiogram. Interpretation.

3. Rapid diagnostic techniques: serological and molecular methods.

Immunological techniques, agglutination, precipitation reactions and complement fixation. Immunoassay techniques. Immunofluorescence. Molecular diagnostic methods, nucleic acid hybridization, PCR, etc..

4. Systemic infections.

Septicemia. Infective endocarditis. Relapsing fever and Lyme disease. Typhoid. Leptospirosis. Brucellosis. Mycoses.

5. Infectious hepatitis.

Etiology. Study of the serological markers used.

6. Central nervous system infections.

Etiology. Acute bacterial meningitis. Chronic meningitis. Meningitis in the neonate.

7. Upper respiratory tract infections and adjoining regions.

The common cold. Viral pharyngitis and tonsillitis and bacterial infections. Infectious mononucleosis. Sinusitis. Diphtheria. Infections of the oral cavity.

8. Lower respiratory tract infections.

Pertussis. Acute bronchitis. Flu. Pneumonia. Pulmonary tuberculosis.

9. Gastrointestinal tract infections.

Gastroenteristis caused by *Salmonella, Shigella, Campylobacter, Yersinia, Vibrio, Aeromonas and Escherichia coli*. *Helicobacter pylori* infections. Viral infections. Foodborne intoxication.

10. Urinary Tract Infections.

Cystitis, pyelonephritis and prostatitis.

11. Sexually Transmitted Diseases.

Gonococcal infections. Gonococcal urethritis. Genital herpes. Syphilis. AIDS. Other sexually transmitted diseases.

12. Other infections.

Conjunctivitis. Keratitis. Endolftalmitis. Infections of the skin and soft tissue. Congenital and perinatal transmission.

13. Fungal Infections.

Superficial mycoses, cutaneous, subcutaneous, systemic, and opportunistic.

14. Importance of parasitological analysis in human health.

Clinical and laboratory diagnosis in Parasitology - The problem of laboratory diagnosis in human parasitology - False positives and false negatives - Types of parasitological analysis - The interpretation of analytical results: its relevance.

15. Parasitological coprology I.

Diet and warnings to the patient - Faecal sample collection, sample size and precautions - Treatment: factors to consider - Preservation: types of preservative liquids, advantages and disadvantages

16. Parasitological coprology II.

Macroscopic and microscopic examinations.- Analytical techniques: direct examination types - Study of faecal digestion - Occult blood smear - Faecal smear: its relevance - Faecal smear stains: types and basics.

17. Parasitological coprology III.

Concentration techniques: principles and types - Concentration by flotation: Willis and Faust techniques- Concentration by sedimentation - Dyphasic analytical techniques: M.I.F. and Formalin-ethyl ether.

18. Parasitological coprology IV.

Special techniques for the search of eggs and/or larvae - Graham tape - Parasitological coproculture: fundamentals and types - Enterotest - Egg and larvae counting: quantitativa assessment.

19. Helminthology - study of adult specimens.

General techniques for morphological and anatomical study of the entire adult and / or fragments of helminth parasites - Digenetic trematodes, Cestodes, Nematodes and Acanthocephales: fixation, preservation, staining, preparation and mounting.

20. Parasitological haematology and genitourinary analyses

Direct examination.- Thin smear.- Thick smear.- Staining.- Concentration techniques.- Genito-urinary analyses.- Direct techniques.- Study of urinary sediment.- Concentration techniques.- Staining.- Cultures.

21. Other biological materials and arthropods.

Analyses of tissues, aspirates and other body fluids.- Cultures and animal inoculation.- Study techniques of arthropods prone to analysis of social impact.

22. Immunological and molecular parasite diagnoses..

Non-specific diagnosis: eosinophilia.- Specific diagnosis: applications of the immune response to the diagnosis of parasitic diseases.- Brief notions on the main reactions of immunological diagnosis in Parasitology.- Advantages and limitations of parasite immunodiagnosis.- Brief notions on molecular parasite diagnosis.

23. LABORATORY PROGRAM

- Coproparasitological analysis.- Study of digestion and its impact on parasitological analysis.
- Wet mount and with colourings.- Fecal smears: preparation and staining.
- Undertaking the most common concentration techniques by flotation and centrifugation.
- Preparing and visualisation of the Graham tape and Kato-Katz smear.
- Preparation of permanent helminth slides.
- Urine analysis.- Urinary sediment study.
- Observation of permanent slides of human parasite species.- Case studies: observation of actual case preparations.
- Observation of permanent slides of arthropod species of medical interest.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	3,00
Theory	30,00
Seminar	2,00
Laboratory	25,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	8,00
Independent study and work	0,00
Preparation of lessons	82,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

Theoretical classes. In these classes the lecturer will give an overview of the topic under study

with special emphasis on new aspects or special complexity and use new teaching tools. During these mandatory classes, the lecturer will explain the problems related to the diagnosis of diseases caused by microorganisms or parasites, as well as the basic methodology to be followed for proper collection and processing of each and every one of the biological samples that can be processed in a laboratory for the diagnosis of these diseases. Meanwhile, students should take note of the information they receive, at the same time they should try to raise any doubts and questions that arise at the time.

Practical classes. Practical classes in the lab focus on two parts: the lecturer will present the objectives, report on material handling, will supervise the job to be done and help with the interpretation of results; by contrast, students will conduct the technical procedure independently.

Tutorials. In these classes, the student may express his/her doubts and needs, while the teacher should guide him/her and solve his doubts in order to achieve a suitable technical knowledge of the subject matter. If students do not express any doubts, the teacher will ask questions related to analysis and thus assess each student¿s level. Students attend tutorials in small groups.

Seminars. Students for voluntary groups of a maximum of four, having to elaborate and deliver an oral presentation, including a written text for the teacher, on a topic proposed by the teacher. The aim of these seminars is for the students to look up information, train the ability to summarize and to express themselves. The ability to work in a team is another objective of these seminars. In both subjects, one seminar each will take place.

OBSERVATION: The agenda contemplated in the academic year 2020-2021 (with health situation maintained by Covid-19) will only be activated if the health situation requires it and with prior agreement of the Governing Council

EVALUATION

To evaluate the learning taking place, it is considered essential to direct observation of the level acquired by the student, which may be made at all hours of attendance, especially and primarily in regard to the observation of daily work performed. This should allow the professor directly establish a dynamic picture of the progress of each student through each part of matter.

However, the numerical grade of knowledge and skills acquired must be established based on methods that allow objective and comparable measure of the same, with record results, which means qualifying written tests.

The evaluation of each part of the course will be done through a final review of the theoretical.

The maximum score can get final is 10 points, corresponding to 60% (6 points) to the microbiological and the remaining 40% (4 points) to the parasite, to break down in:

A) MICROBIOLOGY

1. Evaluation of theoretical content that will be up to 90% of the final grade, and assessed by means of a final exam. In special cases, oral examinations can be made.

2. Evaluation of practical content will be 10% of the final grade, with required implementation. In addition, a specific examination for the evaluation of this section.

3. This activity is **MANDATORY AND NON-RECOVERABLE**, in accordance with the provisions of article 6.5 of the UV Evaluation and Qualification Regulations for Bachelor's and Master's degrees. In the event that, for **justified reasons**, it is not possible to attend, it must be communicated **sufficiently in advance**, so that the person in charge of the subject can assign the student a session in another group. Students will not be able to pass the course without doing and passing the laboratory practicals

4. **The final calification will be global, and to pass the course you must obtain at least 50% of the points in the "evaluation of theoretical content" and in the "evaluation of practical content". In addition, the exam must be balanced and not present serious deficiencies in important concepts or parts of the subject.**

5. Those students who do not take the theoretical exam will be considered not presented for official purposes. Finally, if the student does not pass the theoretical part, the practical grade (passed) **will only be maintained during the following two academic years whether the student enrolls in the subject or not.** After this time, the student **must repeat them again, requesting inclusion in a group of practices.**

B) PARASITOLOGY

1. 90% of the final mark will be obtained by taking a written exam evaluating the contents of the theoretical classes. In exceptional cases, an oral exam can be taken.
2. 5% of the final mark originates from the evaluation of the practical contents, i.e. obligatory attendance (70%) as well as an evaluation of the attitude in the practical classes (30%). Moreover, the presentation of the notebook containing the tasks undertaken (60%) may be demanded or even a specific exam on the tasks carried out (40%).
3. 5% of the final mark originates from the evaluation of tutorials, considering the attitude and dedication of the student.
4. Students who attend a seminar will have up to 5% added to their final mark, taking into account their dedication and tasks carried out.
5. The final mark in Parasitology is a general one, of which at least 50% of the points originate from the evaluation of the theoretical contents. Other marks will then be added accordingly.
6. Those students who are not present in the first call for the theoretical exam are officially

considered absent and will have to be present for the second call. Thus, practice and tutorials (and seminars) will be considered in the second call. Finally, students who do not pass the subject in the academic year will have their assessments kept for the next academic year.students who do not pass the subject in the academic year will have their assessments kept for the next academic year.

Both parts of the subject Microbiological and Parasitological Analyses will have to be passed by the student. Should this not be the case, the mark of the passed subject will be kept for the second call.

Evidence of copying or plagiarism in any of the assessable tasks will result in failure to pass the subject and in appropriate disciplinary action being taken. Please note that, in accordance with article 13. d) of the Statute of the University Student (RD 1791/2010, of 30 December), it is the duty of students to refrain from using or participating in dishonest means in assessment tests, assignments or university official documents.

In the event of fraudulent practices, the **Action Protocol for fraudulent practices at the University of Valencia** will be applied (ACGUV 123/2020):

https://www.uv.es/sgeneral/Protocols/C83sp.pdf

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